

**Remarks/Arguments:**

The present invention is concerned with obtaining stable electrical connections and high overall quality in circuit boards when the substrate material of the board is relatively incompressible. It addresses a problem of undesired flow of a conducting material which may prevent achieving these goals.

Claims 1-12 and 17 are pending in the application. Claims 1-12 and 17 stand rejected under 35 U.S.C. §103(a) as obvious over Jiang et al. (U.S. 6,163,957). It is respectfully submitted, however, that the amended claims submitted here are patentable over Jiang for the reasons set forth below.

Jiang discloses a method for making circuit boards involving filling holes (18) with a "conducting composition" (20). Applicants' invention as recited in amended claim 1, however, includes a feature which is neither disclosed nor suggested by Jiang, namely:

... heating and pressurizing said prepreg sheet and said metallic foil for a specific length of time at a first heating temperature below the softening point of the resin while pressurizing the prepreg sheet and said metallic foil after step (a) at a predetermined pressure . . .  
(emphasis added)

The temperature in this step of the method, step (b) of Claim 1, is set below the softening point of the resin in the prepreg sheet to suppress flow of this resin while at the same time allowing softening of the resin in the conductive paste. As a result the conductive paste is confined to the through-holes while at the same time the metal particles in the paste are welded together and electrical contact with the foil is enhanced.

This feature is supported in the original application at page 6, lines 17-18; page 8, lines 19-20; and Figure 1. Further support is found at page 12, line 23 to page 13, line 5; page 6, line 21 - page 7, line 8; p. 8, line 21-page 9, line 1; and page 12, lines 1-6. No new matter has been added. The softening point of the thermosetting epoxy resin is "about 70 °C", while in the first heating step the

heating temperature is maintained "slightly lower than 70 °C." Furthermore, Figure 1 shows that the actual prepreg sheet temperature (dashed line) lags below the heating temperature (solid line).

This contrasts with the Jiang, the prior art of record. In Jiang, col. 4, line 65 - col. 5, line 18 it is indicated that the softening of resin in the bonding sheet may occur at 100 °C. At the same time, at col. 7, lines 1-2, the melting point of the solder particles in the conductive composition is given as 183 °C, and the "reflow" temperatures are higher than this. Therefore the conductive composition in Jiang could not be welded without also making the resin in the bonding sheet flow. This is contrary to the method of the present application. Furthermore, in Jiang, the conductive composition is deliberately caused to overflow the holes, not to be confined within the holes. See Figures 5, 6, and 8, and col. 7, lines 9 - 17.

It is because Applicants include the feature of a first heating temperature below the softening point of the prepreg resin that the following advantages are achieved: The problem illustrated in Figure 6b and described at page 4, lines 10-19 of Applicants' application, is avoided: because flow of the resin in the prepreg sheet is greatly reduced, the conductive paste does not flow out of the through-hole in the manner indicated by 115 in Figure 6b. This results in high electrical connection quality and stability and lower electrical resistance in circuit boards made with low compressibility prepreg sheets.

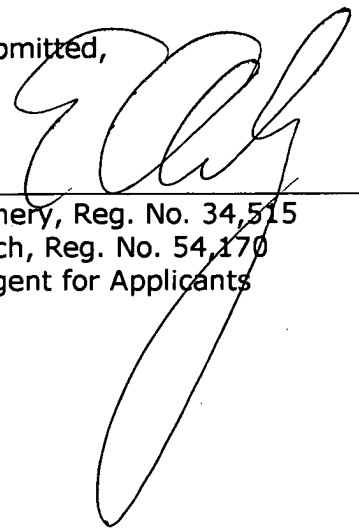
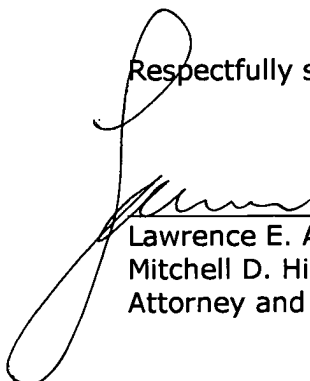
Accordingly, for the reasons set forth above, amended claim 1 is patentable over the art of record. Claim 2 has been amended for proper dependency and clarity. Claims 3, 4 and 17 have been cancelled. Claims 2 and 5-12 include all the features of claim 1 from which they depend. Therefore, Claims 2 and 5-12 are also patentable over the art of record for the reasons set forth above concerning claim 1.

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In view of the amendments and arguments set forth above, the above identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,



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